REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 1, 2, 5, 6, 10-16, 18-20, 47, 48, 51, 52, 54-60 and 62-64 are in the case.

I. THE INTERVIEW

At the outset, the undersigned wishes to thank the Examiner (Ms. Leung) and her supervisor (Ms. Tran) for kindly agreeing to conduct a personal interview on this application. The interview was held on July 21, 2005, and was attended by Ms. Caron Brooke, a European patent attorney representing the assignee of this application , Dr. Bruce Williams, a co-applicant to the present application, as well as by the undersigned. The courtesies extended by the Examiner and her supervisor were most appreciated. The substance of the interview will be clear from the comments presented below.

II. THE 35 U.S.C. §112, SECOND PARAGRAPH, REJECTION

Claim 7 stands rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite. In response, and without conceding to the merit of this rejection, claim 1 has been amended to incorporate the subject matter of claim 7, and claim 7 has been cancelled without prejudice. The 35 U.S.C. §112, second paragraph, rejection has accordingly been rendered moot. Withdrawal of that rejection is respectfully requested.

III. THE OBVIOUSNESS REJECTIONS

As noted above, in order to reduce the issues in this case and to expedite prosecution, claim 1 of this application has been amended to incorporate the subject

matter of claim 7, and claim 7 has been cancelled without prejudice. In addition, claim 47 has been amended to incorporate the subject matter of claim 53, and claim 53 has been cancelled without prejudice. By these amendments, the number of claims under consideration has been decreased, no new issues are raised and no new matter is entered. Entry and favorable consideration of the claims as amended are accordingly respectfully requested.

In light of the amendments effected to claims 1 and 47, it is clear that all of the rejections that do not reject the subject matter of claims 7 and 53 have been rendered moot. Withdrawal of those rejections is accordingly respectfully requested.

The sole outstanding rejection for consideration is the rejection of claims 7 and 53 under 35 U.S.C. §103(a) as allegedly unpatentable over Collin et al (U.S. Patent 4,084,958) in view of Collin et al (U.S. Patent 4,374,663) and Chowdhury (U.S. Patent 4,461,743), and further in view of JP 55-36673 to Takeuchi et al. That rejection is respectfully traversed.

As explained by Dr. Williams during the interview, in reactions involving the introduction of molecular oxygen-containing gas into a reactor containing a catalyst for a heterogeneous gas-phase reaction, there is a need for apparatus for the safe introduction of the molecular oxygen-containing gas. Dr. Williams explained that if a break or leak in an inlet pipe occurs, excess molecular oxygen-containing gas may pass into the reactor which would be undesirable. The present invention focuses on a structure which permits detection of a leak in a pipe which supplies molecular oxygen-containing gas to the reactor to enable the operator to take rapid action to correct the situation.

As now claimed, the reactor of the present invention comprises a grid, more than one inlet pipes for molecular oxygen-containing gas extending into the reactor, surround means for surrounding a substantial portion of the inlet pipes in the reactor with an inert gas and means for detecting a change in pressure in the inert gas surrounding the inlet pipes.

Neither of the cited Collin patents nor Chowdhury describe systems comprising one or more inlet pipes with surround means for surrounding the inlet pipes with an inert gas and means for detecting a change in pressure in the inert gas surrounding the inlet pipes. This is admitted in the first complete sentence on page 8 of the Action.

The above-noted deficiencies are not cured by Takeuchi et al. In order to assist the Examiner in fully considering Takeuchi, an English language translation is attached to the present response. As will be seen from the English language translation, Takeuchi relates to detection of leaks in double-tube pipelines, such as pipelines for conveying oil and the like. As illustrated in the figure of Takeuchi, water is present in the space between the inner tube 1 and the outer tube 2. Leakage of fluid A in the inner tube is detected either by measuring a change in pressure of the water b or observing fluid a floating on water. The pressure of the water b is greater than that of the fluid a to prevent fluid a leaking into the space between the inner and outer tubes. The pressure of water b may be greater than or lower than that of fluid a to detect leakage of fluid a.

In Collin, the purpose of the tube surrounding the inlet pipes is to provide a cooling liquid to prevent iron oxide from sticking to the nozzle and forming a sticky mass. As noted in the '663 Collin patent, a gas such as air is not sufficient for cooling the outer surfaces of the nozzle to prevent this iron oxide formation (column 1, lines 61-

64). In view of this, Collin requires the coolant to be a liquid, preferably water (column 2, lines 11 and 12). Based on this disclosure, one of ordinary skill would not have been motivated to modify Collin in any way to introduce a gas such as air into the cooling tubes since Collin indicates that the use of a gas such as air is not sufficient to achieve the required cooling effect. Takeuchi suggests the provision of water in the space between the inner and outer tubes of the pipeline. Thus, if one of ordinary skill were to combine Collin and Takeuchi (it is believed that this would not have occurred to one of ordinary skill), the outcome would be the same as that shown in Collin namely water in the cooling tubes with the idea of somehow detecting pressure changes to detect leakage. As explained by Dr. Williams during the interview, the present invention requires the presence of an inert gas in the surround means since water, if breakage or leakage occurs, would have a disadvantageous affect catalyst and the reaction occurring in the reactor. Collin teaches away from utilizing a gas such as cooling air and, in light of this, one of ordinary skill would not have been motivated to provide an inert gas in the surround means along with a means for detecting a change in pressure of the inert gas in the surrounding means, as required by the presently claimed reactor. Takeuchi similarly provides no motivation to use a gas since the fluid in the space between the inner and outer walls of the pipeline described by Takeuchi is water.

For all of the above reasons, it is clear that one of ordinary skill would not have been motivated to combine the disclosures of Collin and Takeuchi. Absent any such motivation, a *prima facie* case of obviousness has not been generated in this case. Reconsideration and withdrawal of the outstanding obviousness rejection of claims 7 and 53 are accordingly respectfully requested.

Allowance of the application is awaited.

Respectfully submitted,

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Attachment: English language translation of Takeuchi et al.

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(54) Method for preventing spreading of leaks of fluid conveyed in a double-tube pipeline

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SPECIFICATION

1. Title of the invention

Method for preventing spreading of leaks of fluid conveyed in a double-tube pipeline

2. Scope of patent claim

(1) Method for preventing spreading of leaks of fluid conveyed in a double-tube pipeline, characterised in that the gap between the inner tube and the outer tube of the double tube in a double-tube pipeline is filled with water, and leakage of the fluid being conveyed is detected by detecting either a change in the pressure of the water or the leaked fluid floating on the surface of the water, and in that spreading of leaking of the fluid being conveyed, into the abovementioned gap, is prevented by raising the pressure of the abovementioned water such that it is higher than the pressure of the fluid being conveyed, either at all times or at the time when a leak is detected.

(2) Method for preventing spreading of leaks of fluid conveyed in a double-tube pipeline as claimed in Claim (1), characterised in that the water inside the gap is placed under a fixed pressure which differs from the pressure of the fluid being conveyed, and leakage of the fluid being conveyed is detected by detecting changes in water pressure occurring when a leak has occurred.

(3) Method for preventing spreading of leaks of fluid conveyed in a double-tube pipeline as claimed in Claim (1), characterised in that a leak-detection apparatus for detecting the fluid being conveyed is provided in the gap between the inner tube and the outer tube in a rising part of the pipeline, and the abovementioned detection apparatus is used to detect

leaked fluid which floats upwards due to the difference between its specific gravity and that of water.

3. Detailed description of the invention

This invention relates to a method for preventing spreading of leaks of fluid conveyed in a double-tube pipeline.

Pipelines for conveying oil and the like have employed a double-tube arrangement in order to prevent leaked fluid from spreading to the outside in situations where the fluid being conveyed has leaked. More specifically, in a double-tube pipeline, the inner tube for conveying the fluid is held via spacers on the inside of an outer tube, and, when such a double-tube pipeline is employed, even if a crack or the like occurs in the inner tube and the fluid being conveyed leaks out, the outer tube can prevent the leaked fluid from flowing to the outside.

Now, when leakage of the fluid being conveyed occurs in such a double-tube pipeline, this needs to be detected and the site of the leak rapidly repaired; to which end, in the prior art, the gap between the inner tube and the outer tube is filled with a gas (air or an inert gas), this gas is placed under a fixed pressure, and leakage of the fluid being conveyed is detected by detecting the change in the gas pressure which occurs when the fluid being conveyed leaks into the abovementioned gap, and thus there have been problems not only in that it has not been possible to implement high-accuracy leak detection but also in that the fluid which has leaked into the gap ends up flowing to the outside during repair of the site of the leak. More specifically, in methods for detecting leaks by means of a change in gas pressure such as the method described above, the volume of the gas changes greatly due to changes in temperature and thus small leaks cannot be detected, in addition to which, in cases where a certain amount of fluid being conveyed leaks into the gap and where the fluid being conveyed is oil or the like, the fluid being conveyed collects on the inner floor part of the interior gap and thus the fluid being conveyed (which has collected on the inner floor part of the gap) remains inside the gap even after removing the gas inside the gap and the fluid being conveyed inside the inner tube during repair of the site of the leak, and, when the outer tube is cut in order to repair the site of the leak, the leaked fluid on the inside of the gap flows to the outside and secondary spreading occurs, and particularly in sea-floor pipelines the seawater becomes polluted as large amounts of the leaked fluid flow out into the sea.

The present invention has taken the above situation into account, and it aims to provide a method for preventing spreading of leaks of fluid conveyed in a double-tube pipeline, arranged in such a way that, by filling the gap between the inner tube and the outer tube with water and setting the pressure of the water such that it is higher than the pressure of the fluid being conveyed inside the inner tube, it can, when a leak occurs: reduce the amount of fluid leakage into the gap; prevent the occurrence of secondary spreading whereby the leaked fluid flows to the outside during repair of the site of the leak; and allow high-accuracy leak detection by using the abovementioned water.

An embodiment of this invention is described below with reference to the figure.

In the figure, the reference 1 is the inner tube and 2 is the outer tube of a double-tube pipeline, and a fluid *a* being conveyed is conveyed under pressure inside the inner tube 1. The method for preventing spreading of leaks of the fluid being conveyed is arranged in such a way that, when a leak has occurred, spreading of the leak of the fluid *a* being conveyed, into the abovementioned gap, is prevented by filling the gap between the inner tube 1 and the outer tube 2 of the double tube with water *b* and setting the pressure of the water *b* such that it is higher than the pressure of the fluid being conveyed inside the inner tube 1 when leakage of the fluid *a* being conveyed is detected; and leakage of the abovementioned fluid *a* being conveyed is detected either by detecting a pressure change in the abovementioned water *b* or by detecting leaked fluid floating on the surface of the water. More specifically, when leakage is to be detected by means of a pressure change in the water *b*, the water *b* inside the abovementioned gap should be placed under a fixed pressure which differs from the pressure of the fluid being conveyed inside the inner tube 1 (in this embodiment, the pressure is lower than the pressure of the fluid being conveyed) and the pressure change which occurs when the fluid *a* being conveyed leaks into the gap should be detected; and this allows reliable detection of even small leaks since, as compared with gases, water undergoes little pressure change due to the effects of temperature. Further, when leakage is to be detected by detecting leaked fluid floating on the surface of the water, a leak-detection apparatus for detecting the fluid being conveyed is provided in the gap between the inner tube and the outer tube in a rising part of the pipeline (in a sea-floor pipeline, the rising part should simply be used, while, in a land-based pipeline, a rising part should be expressly provided) – the abovementioned leak-detection apparatus being positioned on the surface of the water or close to the surface of the water on the inside – and the abovementioned detection apparatus should be used to detect leaked fluid which floats upwards due to the difference between its specific gravity and that of water; in which case leakage can be detected with even better accuracy than in the method in which a pressure change is detected.

Thus, with this method for preventing spreading of leaks of fluid being conveyed, the abovementioned means ensure that leakage of fluid being conveyed is detected without overlooking even small leaks, and, when a leak is detected, the amount of fluid leakage can be reduced and spreading of leaks of fluid being conveyed into the abovementioned gap can be prevented by setting the pressure of the water *b* such that it is higher than the pressure of the fluid being conveyed inside the inner tube 1.

It will be appreciated that the above embodiment is arranged in such a way that the pressure of the water in the gap is raised when a leak is detected, but the pressure of the water may be kept higher than the pressure of the fluid being conveyed at all times, and, in this case too, leak detection can be implemented in the same ways as described above. Further, in this method for preventing spreading of leaks of fluid being conveyed, because the gap between the inner tube and the outer tube is always filled with water, it is preferable to mix an inhibitor (chemical-reaction inhibitor) in with the water in order to prevent corrosion of the outer surface of the inner tube and the inner surface of the outer tube.

Further, in the case of a sea-floor pipeline, when a leak has occurred the site of the leak is repaired by cutting the outer tube after having removed the fluid being conveyed inside the inner tube and replacing it with water, while, in the case of a land-based pipeline, it is repaired by cutting the outer tube after having removed the fluid being conveyed inside the inner tube and the water inside the gap and after having passed water through the inside of the inner tube to clean it; and, here, the fluid such as oil being conveyed which has leaked into the gap floats up onto the surface of the water due to the difference between its specific gravity and that of water and, in the case of a sea-floor pipeline, it collects on the surface of the water inside the rising part (and the leaked fluid collecting here should be removed by an appropriate means), while, in the case of a land-based pipeline, it is removed together with the water, and thus the leaked fluid does not flow to the outside and secondary spreading does not occur even though the outer tube is cut.

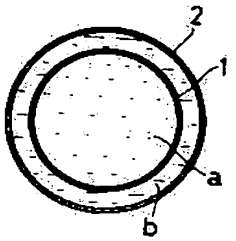
Because this invention is as described above, by filling the space between an inner tube and outer tube with water and setting the pressure of the water such that it is higher than the pressure of the fluid being conveyed inside the inner tube, it can, when a leak occurs: reduce the amount of fluid leakage into the gap; prevent the occurrence of secondary spreading whereby the leaked fluid flows to the outside during repair of the site of the leak; and allow high-accuracy leak detection by using the abovementioned water.

4. Brief explanation of the drawings

The figure is a cross-section of a pipeline illustrating one embodiment of this invention.

1 ... inner tube, 2 ... outer tube, *a* ... fluid being conveyed, and *b* ... water.

Agent for the applicant Patent attorney Takehiko SUZUE



TRANSLATOR'S NOTES

REF: JAPANESE PATENT KOKAI NO. S 55-036673

The following points were noted while translating the above text.
(Page references refer to the Japanese source text. Where a point occurs more than once, only the first instance is noted below).

Throughout the text

Semicolons, colons and phrases demarcated by dashes have no equivalents in the Japanese, but have been inserted by the translator in the hope of making the English text more readily understandable on the first reading.

Section	Para	Line	Comment
3	1	18	The phrase "*interior gap*" (rather than simply "*gap*") reflects the Japanese. This seems likely to be an unintentional inconsistency with the rest of the text.
3	1	20	The phrase brackets around the phrase "*which has collected on the inner floor part ...*" have been inserted by the translator in the hope of aiding comprehension on the first reading.

End of Translator's Notes

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